Simplified, Parallelized InSAR Scientific Computing Environment

Completed Technology Project (2017 - 2019)

Project Introduction

There is a vast amount of SAR data that is challenging for scientists to use. We propose a variety of technologies in SAR processing that will accelerate the processing and the use of the science products. Specifically, we will: 1) Develop methods of computational acceleration by exploiting back projection methods on cloud-enabled GPU platforms to directly compute focused imagery in UTM (landsat grid). This will deliver SAR data to users as user-ready products, in a form that is most familiar to them from optical sensors and which has never been done before. It has been a major obstacle for scientists to adopt radar data. Once formed, the data can be accessed on standard GIS platforms. We could greatly reduce the processing complexity for users so they can concentrate on the science, and bring the products seamlessly into the 21st century tools that are rapidly evolving to handle the developing data explosion; 2) Develop python-based framework technologies at the user interface that support a more natural way for scientists to specify products and actions, thereby accelerating their ability to generate science results 3) Extend the ESTO-funded InSAR Scientific Computing Environment framework to uniformly treat polarimetric and interferometric time-series such as those that will be created by the NISAR mission using serialized product-based workflow techniques. There are several key challenges that need to be addressed in parallel: 1) speed and efficiency in handling very large multi-terabyte time-series imagery data files. This requires innovations in multi-scale (GPU, node, cluster, cloud) workflow control; 2) framework technologies that can support the varied algorithms that these data can support, from SAR focusing, interferometry, polarimetry, interferometric polarimetry, and time-series processing; framework technologies that can support heterogeneous, multi-sensor data types (point-clouds and raster) in time and space. NASA's upcoming radar mission, NISAR, will benefit from this technology after its planned launch in 2021, but first the vast archive of all international missions such as the Sentinel-1 A/B data at the Alaska Satellite Facility can be exploited more fully.

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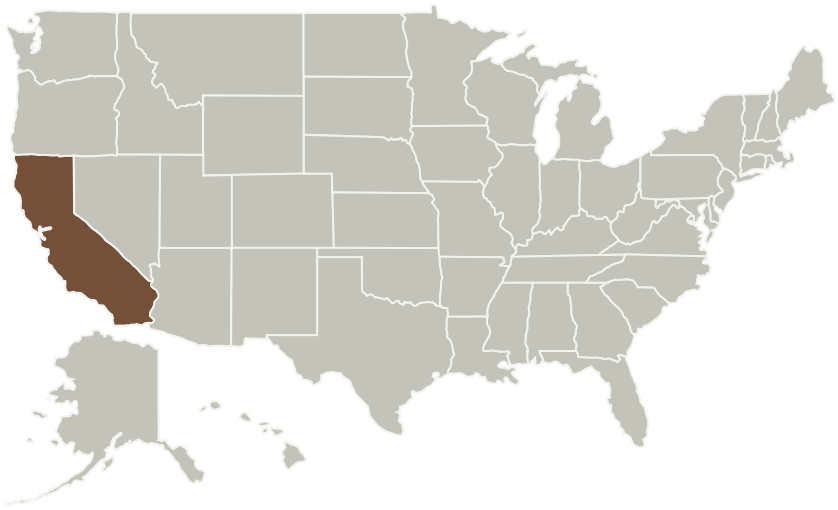
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
California Institute of Technology(CalTech)	Lead Organization	Academia	Pasadena, California

Primary U.S. Work Locations
California

Organizational Responsibility

Responsible Mission Directorate:

Science Mission Directorate (SMD)

Lead Organization:

California Institute of Technology (CalTech)

Responsible Program:

Advanced Information Systems Technology

Project Management

Program Director:

Pamela S Millar

Program Manager:

Jacqueline J Le Moigne

Principal Investigator:

Paul A Rosen

Co-Investigators:

Howard A Zebker
Piyush S Agram
Eric M Gurrola
Michael Aivazis
Joshua Cohen
Karen R Piggee

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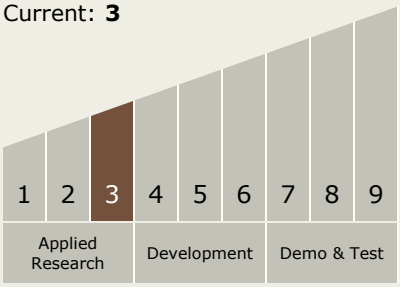
Technology Maturity (TRL)

Start: **3**
Current: **3**



Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  - TX11.6 Ground Computing
    - TX11.6.5 Public Cloud Supercomputer

Target Destination

Earth